PLEASE NOTE

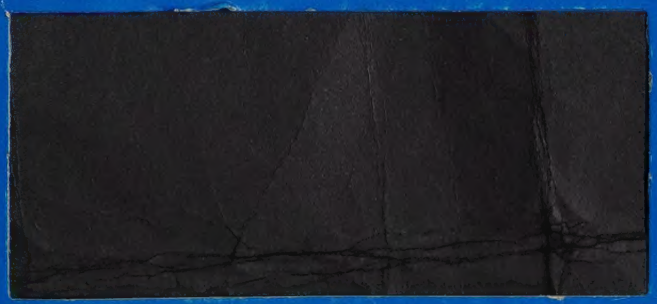
FAILURE TO RETURN THIS MANUAL WILL RESULT IN A MINIMUM BILLING CHARGE OF **$50.00.**

PLEASE INCLUDE MANUAL AND ACCESSORIES WHEN RETURNING EQUIPMENT

L16 Rev. 10/82

Leasametric

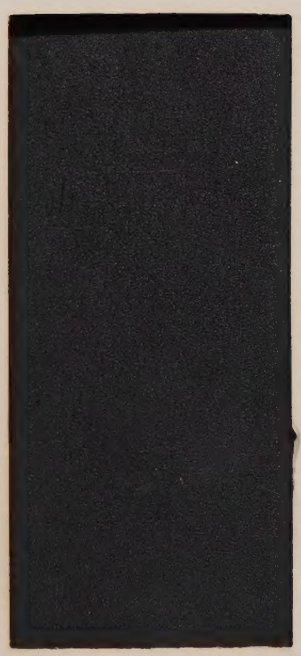
1166 TRITON DR. • FOSTER CITY, CA 94404



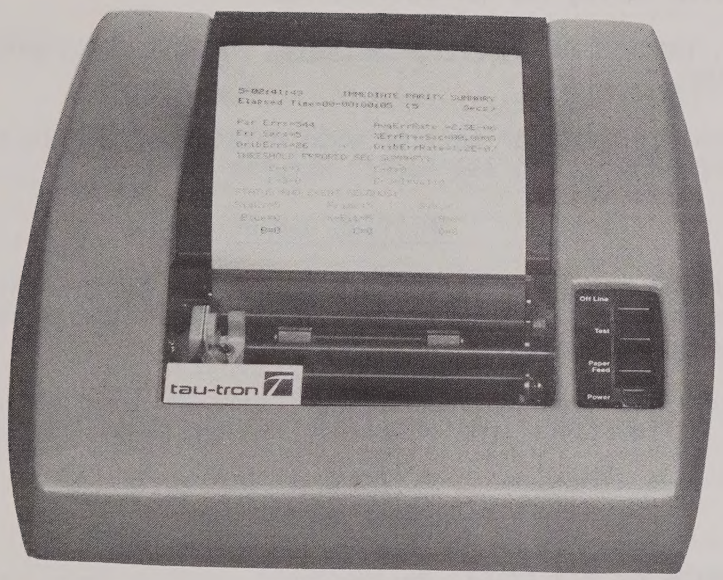
tau-tron

A UNIT OF

GENERAL SIGNAL



tau-tron
A UNIT OF
GENERAL SIGNAL



5901
PRINTER

INSTRUCTION MANUAL

8200-0144

FORM 0236-1082A

© 1985 by Tau-tron Inc. 10 Lyberty Way, Westford, MA 01886
(617) 692-5100 Telex 750245 1-800-TAU-TRON (Outside MA)

WARRANTY

All Tau-tron products are warranted against any defects in material and workmanship. This warranty applies for one year from the date of delivery for all Tau-tron manufactured products. The warranty period for OEM products sold by Tau-tron will depend on the original OEM warranty (consult factory for specific products). We will repair or replace products which, upon our examination, prove to be defective during the warranty period.

NO OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING FITNESS FOR PURPOSE, MERCHANTABILITY OR OTHERWISE, IS GIVEN.

For assistance, contact Customer Service with details of the instrument model, serial numbers, and malfunction; see Repair Returns below.

SHIPPING DAMAGE

If any signs of damage are noted on the outside of the carton, request that the carrier's agent be present during unpacking. If external damage is found on the instrument, follow Repair Returns procedure below.

Check the electrical performance of the instrument as soon as possible after receipt. If any malfunctions are observed, follow Repair Returns procedure below.

REPAIR RETURNS

For mechanical damage or electrical malfunctions, notify Tau-tron immediately. If the damage occurred during shipping, also notify the carrier. To return a unit for repair:

1. Call the Customer Service Department, (617) 692-5100, for a Repair Authorization Number. This will reduce administrative delays and ensure prompt return of your unit.

2. Complete and attach the Repair Tag, in the rear of the manual, to your unit for positive identification.

3. Pack the unit in the original shipping carton and packing materials, if available. Otherwise use a double-walled carton (test strength of 350 lb; 159 kg) and shock-absorbing material such as bubblewrap to prevent the unit from moving in the carton during transit. Secure the carton by sealing with heavy paper tape.

4. Send to: Tau-tron Inc.
   10 Lyberty Way
   Westford, MA 01886
   Attn: Customer Service

CONTENTS PAGE

LIST OF ILLUSTRATIONS

1. SCOPE 1-1

2. DESCRIPTION 2-1

3. SPECIFICATIONS 3-1

3.1 Type 3-1
3.2 Character 3-1
3.3 Speed 3-1
3.4 Input 3-1
3.5 Paper 3-1
3.6 Power 3-1
3.7 Mechanical 3-1
3.8 Accessories Supplied 3-2
3.9 Accessories Available 3-2

4. FRONT PANEL 4-1

5. OPERATION 5-1

5.1 Initial Setup 5-1
5.2 Print Speed/Autoprint 5-1
5.3 Printer Output 5-2

5.3.1 Error-Second Printout 5-2
5.3.2 Summary Printout 5-4

5.4 Paper Loading 5-6

6. REAR PANEL 6-1

6.1 RS-232-C Interface 6-1
6.2 Signal Levels and Timing 6-2
6.3 Selecting RS-232-C or 20mA Current Loop 6-3
6.4 Baud Rate Selection 6-3
6.5 Byte Format 6-4

7. THEORY OF OPERATION 7-1

7.1 Introduction 7-1
7.2 Interface and Signal Connections 7-1
7.3 Software Control of Mixed Character Size 7-2
7.4 Linefeed (New Line) 7-2
7.5 Reverse Printing 7-2

8. SERVICE 8-1

8.1 Routine Service 8-1
8.2 Repair Returns 8-5

CONTENTS PAGE

8.3 Assistance 8-5
8.4 Printhead Maintenance 8-5

8.4.1 Printhead Access 8-5
8.4.2 Damaged Platen (Print Block) 8-5
8.4.3 Printhead Replacement 8-5
8.4.4 Case Removal 8-6
8.4.5 50/60Hz Operation 8-6
8.4.6 Storage 8-7
8.4.7 Self Test 8-7

8.5 Trouble Analysis 8-8

8.5.1 Poor Quality Printout 8-8
8.5.2 No Printout 8-9
8.5.3 Garbled Printout 8-10

9. Replaceable Parts 9-1

10. Diagrams 10-1

LIST OF ILLUSTRATIONS

FIGURE	DESCRIPTION	PAGE
4-1	Front Panel	4-1
5-1	Error-Second Printout	5-3
5-2	Summary Printout	5-4
5-3	Paper Loading	5-6
6-1	Rear Panel	6-1
8-1	Lubrication Points	8-1
10-1	Ascii Codes	10-1
10-2	Component Layout Diagram	10-2
10-3	Printer Schematic Diagram	10-3
10-4	HS Component Layout Diagram	10-5
10-5	HS Schematic Diagram	10-6
10-6	Motor Delay Circuit Diagram	10-7

Digitized by the Internet Archive
in 2025

https://archive.org/details/manualsplus_10511

1. SCOPE

This instruction manual provides operation, theory of operation, maintenance and troubleshooting information for the Tau-Tron 5901 Printer.

2. DESCRIPTION

The Tau-Tron 5901 Printer is designed as a self-contained 120-line/minute printer which can be interfaced directly with serial (RS-232-C or 20mA current loop) input codes from a computer system or other data source.

The printer is small, quiet, simple to operate and requires a minimum of maintenance. The Tau-Tron 5901 Printer includes upper/lower case characters, low paper detector, bell, built-in self-test routine, variable character size, case and power supply. Interface to the printer is via an RS-232-C/20mA serial input (switch-selectable from 50 to 9600 baud). The printer also has a 256-character multiline input buffer that is useful for serial data transmission, where the size of the buffer reduces the short term likelihood of lost data or time-outs.

3. SPECIFICATIONS

3.1 TYPE

High-speed electrosensitive, microprocessor controlled.

3.2 CHARACTER

5 x 8 dot matrix, 40 columns per line (10 columns per inch), 5 lines per inch, 96-character ASCII.

3.3 SPEED

2 lines per second, up to 160cps continuous.

3.4 INPUT

Serial RS-232-C, 7-or 8-bit byte length, at 15 switch-selectable rates to 9,600 baud; selectable odd, even, or no parity. Rear-mounted 25-pin DB-25S connector with the following pinout:

PIN	FUNCTION	PIN	FUNCTION
1	Chassis gnd	7	Signal gnd
2	Not used	8	-20mA
3	Received Data	9	+20mA
4	Not used	13	+5V
5	Not used	20	DTR (overrun)*

All pins not listed have no connection.
* Goes to -V when input buffer is filled.

3.5 PAPER

Electrosensitive, 5 in. wide x 200 ft, roll.

3.6 POWER

105 to 125V ± 10%, 50/60Hz, 50VA, supplied via attached 5-ft power cord.

3.7 MECHANICAL

Portable bench-top blue-painted case. DIMENSIONS: 3.375 in. high including roll of paper x 11.65 in. wide x 6.25 in. deep. WEIGHT: 12 lb net, 17 lb shipping.

3.8 ACCESSORIES SUPPLIED

Null modem, 10-ft interconnecting cable, 1 roll of paper and Instruction Manual.

3.9 ACCESSORIES AVAILABLE

OP-07 Print Paper, box of ten 200-ft rolls.
OP-10 Soft carrying case.

4. FRONT PANEL

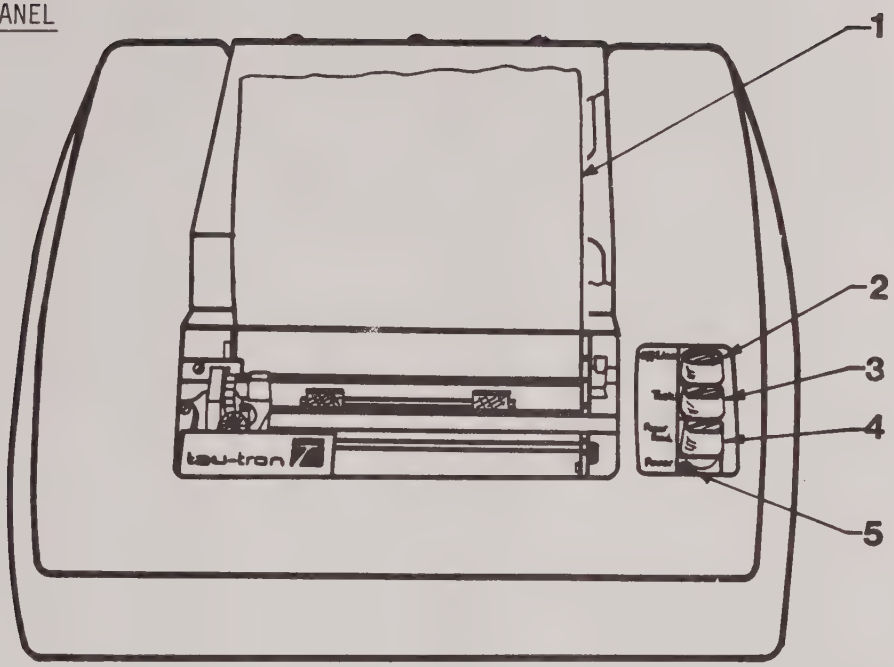


FIGURE 4-1, FRONT PANEL.

1. Paper — Electrosensitive, 5 in. wide x 200 ft, roll.

2. OFF LINE — Pushbutton, alternate action switch, pushed will prevent the printer from accepting or printing out further incoming data. At the moment that the OFF-LINE switch is pushed, the unprinted contents of the line buffer will be lost.

3. TEST — Pushbutton, alternate action switch, pushed will cause the printer to cycle through an internal routine generating ASCII characters in sequence. The size and set of characters printed during the test routine will depend on the exact mode of operation that the printer is in when the test is activated. In addition, the printer will only respond to the Test when it is in an off-line condition.

4. PAPER FEED — Pushbutton, momentary action switch used to run out a length of paper. It may be used at any time to insert extra space into a printed message without loss of incoming data.

5. POWER — Indicator, comes on after power has been activated by the rear-panel ON/OFF rocker switch.

5. OPERATION

The Tau-Tron 5901 Printer is designed for operation with Tau-Tron's S5200D Digital Transmission Test Set Receiver. All print functions are handled by the Tau-Tron unit driving the printer. Printer capabilities and sample printouts used with the S5200D Receiver are explained and shown in Paragraphs 5.3 and 5.4.

5.1 INITIAL SETUP

Check the following before connecting the line cord to the AC receptacle:

1. Voltage Setting: The printer is normally supplied set up for 115Vac at 60Hz., but if the user's power source is different or the printer has a selectable range, then the user should confirm that the setting agrees with the power source.

2. Fuse: The fuse on the rear panel is correct at:

   3/4A slo-blo for 100-125 Vac or 4/10A slo-blo for 220-240Vac.

3. Paper: (Refer to Paragraph 5.4, Paper Loading.) Remove all packing material from around the paper roll before attempting to load paper.

4. Input Signal Connection: The input signals are sent through a cable and plug to the multi-pin receptacle on the rear panel. Ensure that these connectors are firmly joined. Signal characteristics and pin designations are given in Section 6.

After these setup procedures, the printer may be turned on.

5.2 PRINT SPEED/AUTOPRINT

The Tau-Tron 5901 printer requires a half second to print a line or perform a linefeed, regardless of the number of characters printed.

As soon as a complete line has been received, printing will be initiated when the next character is received whether or not this character is an (LF).

The number of characters per line is selectable as 80, 40, or 20 and the character size is in a corresponding 1:2:4 ratio. Autoprint will be initiated when 80, 40, or 20 characters have been received in the appropriate fixed format, or a number proportioned to their size when character sizes are mixed on a single line.

For example, 10 large characters (each taking 4 spaces) + 10 medium (2 spaces) +20 small (single space) will activate the autoprint feature. Various printing characteristics maybe selected by plugging in or removing jumpers on the circuit board. (Refer to Section 7, Theory of Operation.)

NOTE: The printer is shipped configured to print 40 characters per line.

5.3 PRINTER OUTPUT

The Tau-Tron 5901 Printer can print out S5200D Receiver measurements via the RS-232-C Interface. This paragraph describes typical printouts as selected through the S5200D Receiver front-panel controls. Details of the RS-232-C Interface are provided in Section 6, Rear Panel.

Two types of printouts are available, error-second and summary. Both can be selected to print either bit errors or parity errors. Error-second printouts occur at the end of any error-second. Summary printouts occur at the end of any timed test (Single or Repeat) or at any time on demand.

5.3.1 ERROR-SECOND PRINTOUT

If the user requests an error-second printout, a message is printed upon the occurrence of each error-second of error selected (PARITY or BIT). The message includes time-of-day (accurate to within one second at the end of an error-second), the number of errors in that error-second, and the status of all the internal and external events (A, B, C, D, Signal Loss, DS3 Frame Loss, Data Sync Loss, Blue Signal Detected, and X-Bit Detected). For further information regarding error-seconds, refer to the S5200D Digital Transmission Test Receiver User Manual. Typical error-second printouts are shown on the following page.

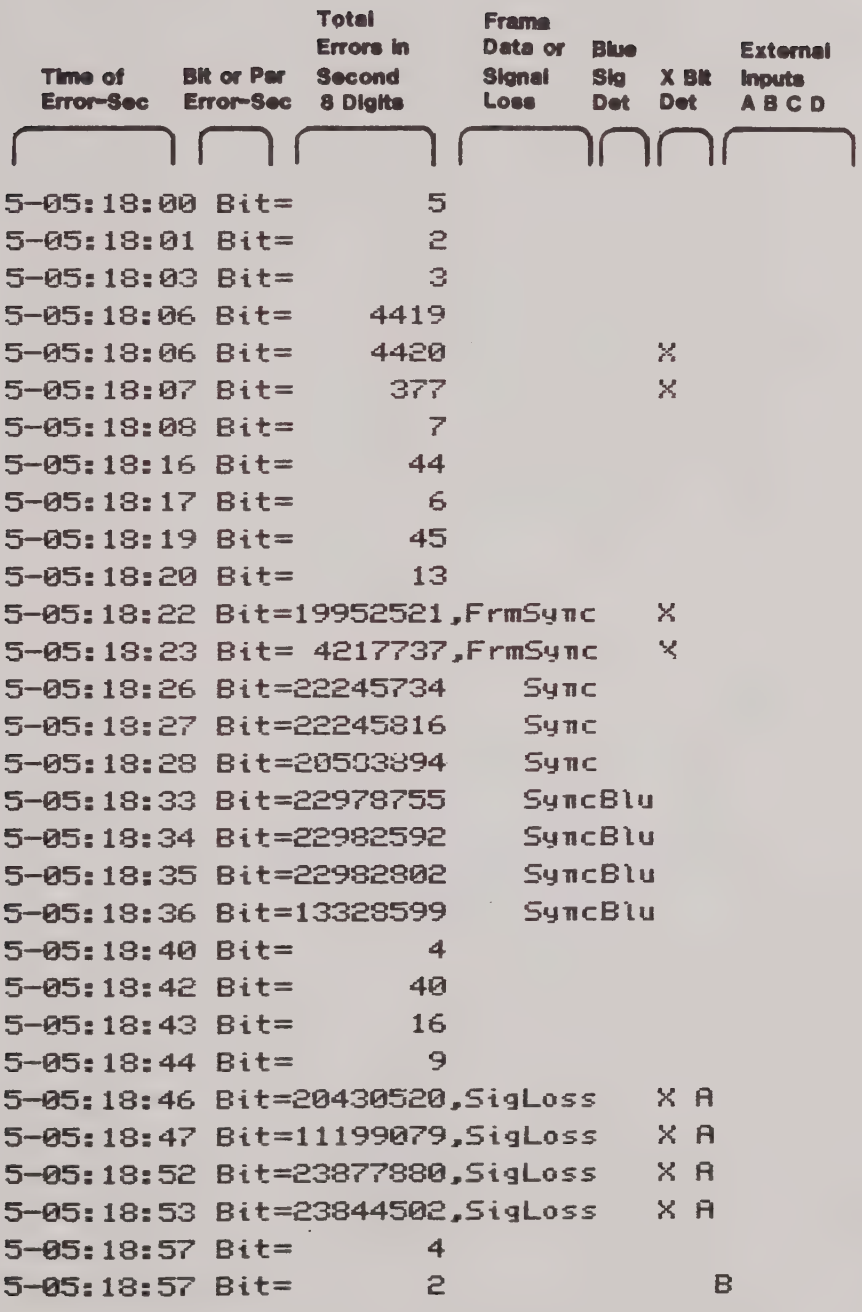


FIGURE 5-1, ERROR-SECOND PRINTOUT.

5.3.2 SUMMARY PRINTOUT

When the printer is enabled, a summary message is printed upon completion of each timed test (Single or Repeat). The message includes the test's duration, the event-seconds for all nine internal and external events, and the following values for the type of measurement (PARITY or BIT) selected: total errors, error-seconds, average error-rate, % error-free seconds, total dribbling error-rate, and threshold error-second totals for E-6, E-5, E-4, and E-3. All measurements are labeled with an appropriate mnemonic.

A summary may be requested at any time by selecting the immediate summary print function (refer to the S5200D Digital Transmission Test Receiver User Manual). Bit or Parity immediate summaries maybe selected independently of other print functions. The format of an immediate summary is identical to an end-of-interval summary. The first line of the summary indicates which type has been output.

A typical summary printout is shown and the fields described.

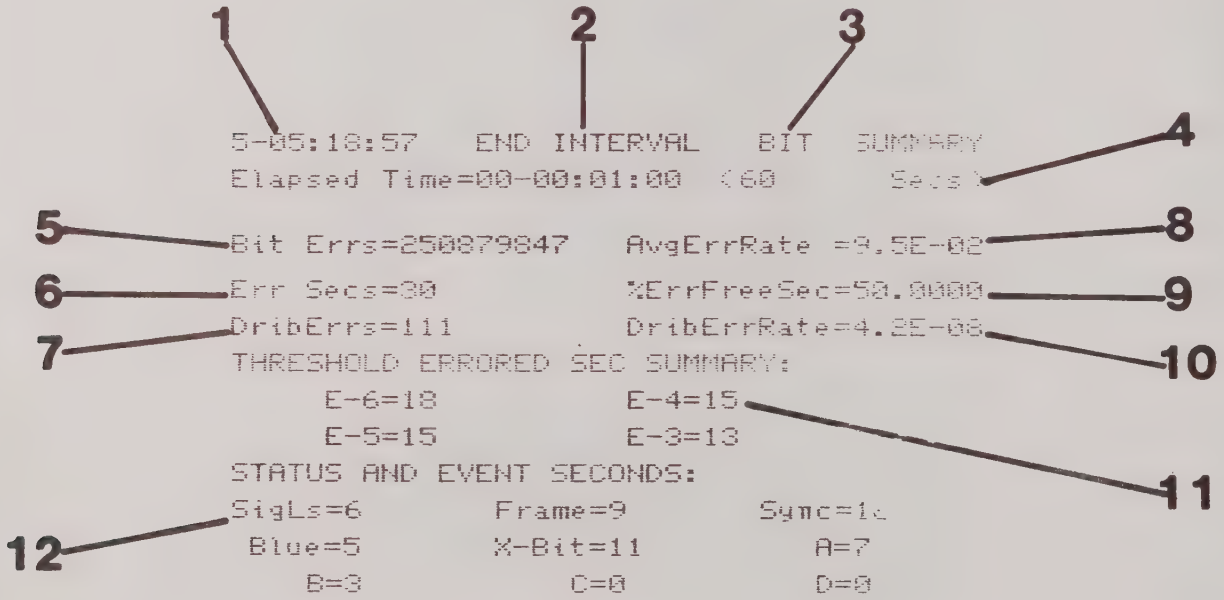


FIGURE 5.2, SUMMARY PRINTOUT.

1. Time of day when summary was formatted: day of week-hour of day: minutes of hour: seconds of minute.

2. Summary type: end of interval or immediate.

3. Measurement type: bit or parity.

4. Elapsed time: days-hours: minutes: seconds and total seconds.

5. Total errors since start of elapsed interval: bit or parity total.

6. Total error-seconds since start of elapsed interval.

7. Total dribbling errors since start of elapsed interval.

8. Average error-rate= $\frac{\text{total errors}}{\text{bit rate x elapsed time in seconds}}$

9. % error-free seconds= $\frac{\text{elapsed time in seconds-error secs}}{\text{elapsed time in seconds}} \times 100$

10. Dribbling error-rate= $\frac{\text{total dribbling errors}}{\text{bit rate x elapsed time in seconds}}$

11. Threshold error-seconds: number of error-seconds during which the error-rate exceeded 10^{-6}, 10^{-5}, 10^{-4}, or 10^{-3}. Dribbling error-seconds may be computed by subtracting the number of 10^{-6} error-seconds from the total error-seconds.

12. Status and event seconds: number of seconds during which any of the listed events were detected. These status event seconds are not synchronized to error-seconds.

5.4 PAPER LOADING

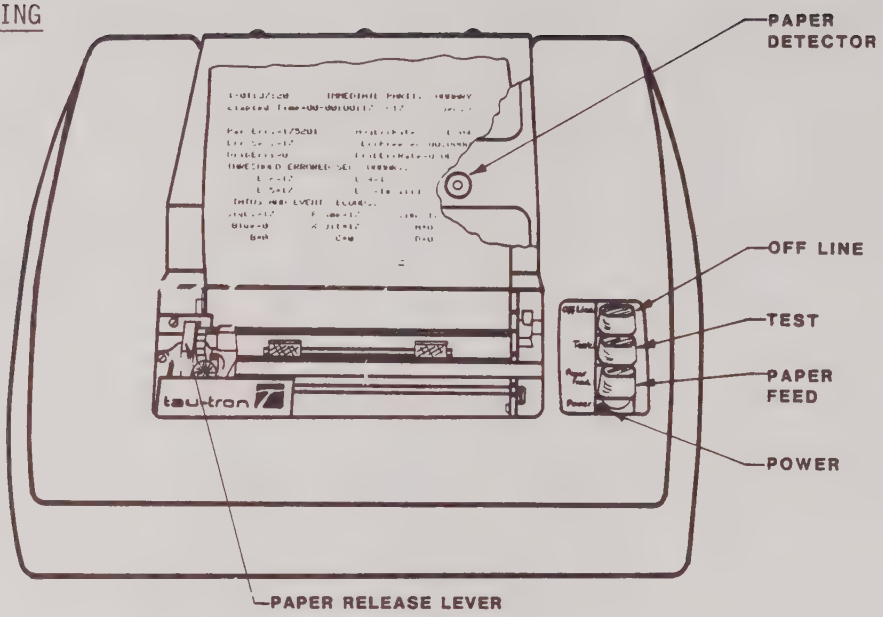


FIGURE 5-3, PAPER LOADING.

Paper loading may be performed without disconnecting power.

1. Open paper lid, exposing old paper roll tube. Brief instructions for paper loading are printed inside this lid.
2. Remove old paper tube by gently pushing down on the retaining tabs in the side walls of the paper cavity. Remove the plastic core from the old paper-roll tube.
3. Insert the core into a new paper roll so that it is centrally located. Drop the paper roll into the paper cavity in the printer case so that the sensitive (aluminized) side of the paper faces downward as it is brought forward to the printer mechanism. The paper roll should rotate freely on the central core which should be securely clamped by the retaining tabs.
4. Tear or cut the paper diagonally with the point at the left, removing any torn or badly creased length of paper.
5. Pull the paper release lever forward and guide the paper down the slot immediately behind the print block.

6. The paper should reappear under the plexiglass screen. Feed through until the full width of the paper is running freely, then let go of the paper release lever. Push the paper feed button for a few automatic paper feeds before replacing the top cover.

7. Lower the paper lid, otherwise the printer will register a paper low and will not operate.

The paper may be torn off by pulling diagonally forward, across the cutting edge of the front panel on the top cover. Check that the most recently printed line is visible above the plexiglass screen before tearing off the message. The user can also insert two or more extra line feeds to separate messages and bring the last line above the tear-off point.

CAUTION: If the paper appears not to have torn off cleanly, or if there is any doubt that the paper is running freely, then test with several paper feeds, and if necessary reload the paper. Improper loading of the paper is the most common cause of service problems and possible damage to the printhead.

6. REAR-PANEL

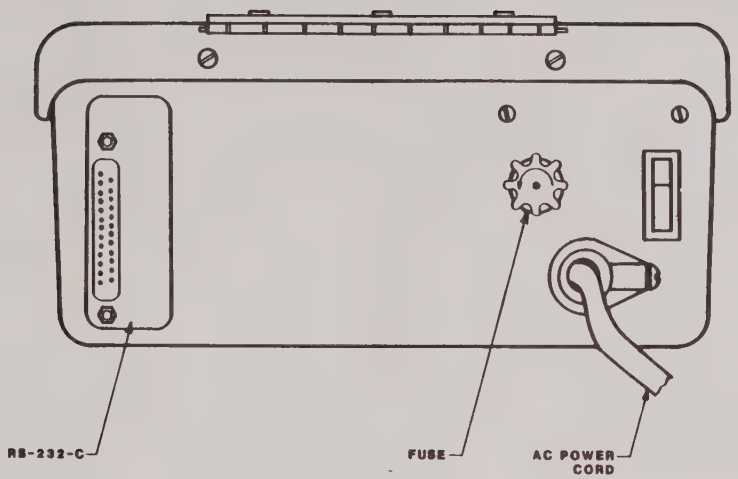


FIGURE 6-1, REAR PANEL.

6.1 RS-232-C INTERFACE

A 25-pin DB-25S connector is provided on the rear panel of the printer for serial input. Measurements from the S5200D Receiver are input through this interface to the printer. In addition to an RS-232-C Interface, a null modem is supplied. This is because the RS-232-C specifies equipment as either "data-terminal" or "data-communications". Consequently, when similarly configured equipment try to talk to each other, this null modem is required. Since both the S5200D and the 5901 Printer are configured as "data-terminal" equipment, the null modem allows each device to see the other as "data-communications" equipment. The diagram below lists RS-232-C pin connections on both sides and shows the null modem wiring.

S5200D PINOUT	NULL MODE CONNECTIONS		5901 PRINTER PINOUT
Protective Ground	1	1	Protective Ground
Transmitted Data Out	2	2	Transmitted Data Out - unused
Received Data In	3	3	Received Data In - data to be printed
Request to Send Out	4	4	Request to Send Out - unused
Clear to Send In	5	5	Clear to Send In - unused
Data Set Ready In	6	6	Data Set Ready In - unused
Signal Ground	7	7	Signal Ground
Received Line Signal	8	8	Received Line Signal Detect - unused Detect in
Data Terminal Ready Out	20	20	Data Terminal Ready Out - Printer ready to Accept Data

All other wires in the 25-wire interface are not connected. A null modem with this configuration is shipped with the 5901 Printer.

The RS-232-C cable shipped with the 5901 Printer is a 9-wire 10-foot cable. The pinout is straight-through (no cross-connection) on pins 1-8 and 20. All other pins are not connected.

The 5901 Printer is shipped from Tau-Tron in the following configuration:

1200 baud

7-bit word length

1 stop bit

no parity

The S5200D Receiver should be configured according to the rear-panel DIP switches to talk to the 5901 Printer:

1200 baud

7-bit word length

2 stop bits

no parity

NOTE: Configuring the S5200D to transmit 2 stop bits ensures the 5901 Printer will detect the next start bit and resync on it.

The DIP switch on the S5200D Receiver should be set as follows:

SWITCH:	1	2	3	4	5	6	7	8
SETTING:	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF

6.2 SIGNAL LEVELS AND TIMING

RS-232-C:

MARK = binary 1 = -23V to -3V = (-V or OFF).
SPACE = binary Ø = +3V to +25V = (+V or ON).

Open circuit or 300 ohms to ground on input = mark.

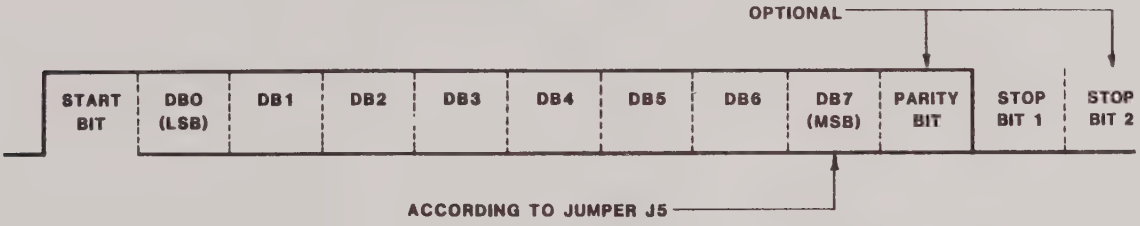
20mA Current Loop:

MARK = binary 1 = 20mA current flowing.

SPACE = binary Ø = No current flowing - open circuit.

Opto-isolator input is current limited with a 300-ohm series resistor, giving a typical input voltage drop of 5V.

Serial Input Timing:



Refer to Section 3, Specifications, for pinout.

6.3 SELECTING RS-232-C OR 20mA CURRENT LOOP

All Tau-Tron 5901 Printers are supplied set for RS-232-C as standard equipment.

To convert to the 20mA Current Loop Input, connect the RS-232-C data input (Pin 3 on the rear-panel D-connector) to +5V (Pin 13). Pins 8 and 9 can then be used respectively as - and + 20mA Current Loop inputs. Some units may have a 10-position switch on the controller PC opposite the input connector, where closing (ON) #9 position connects the RS-232-C input to +5. All other switches must be open (OFF).

6.4 BAUD RATE SELECTION

Input baud rates are selected on an 8-position DIP switch on the HS PC card.

OFF = Open = 1 (Hi)

ON = Closed = Ø (Lo)

	SWITCH #			
BAUD RATE	5	6	7	8
50	0	0	0	0
75	0	0	0	1
110	0	0	1	0
134.5	0	0	1	1
150	0	1	0	0
300	0	1	0	1
600	0	1	1	0
1200	0	1	1	1
1800	1	0	0	0
2000	1	0	0	1
2400	1	0	1	0
3600	1	0	1	1
4800	1	1	0	0
7200	1	1	0	1
9600	1	1	1	0

6.5 BYTE FORMAT

The following is selected on the 8-position DIP switch on the HS PC card.

SWTICH NO.	OPEN (=Hi=1)	CLOSED (=Lo=Ø)
1	No parity	Parity as selected by switch 4.
2	2 stop bits	1 stop bit
3	8 data bits	7 data bits
4	Even parity	Odd parity

7. THEORY OF OPERATION

7.1 INTRODUCTION

The electronic interface is controlled by a microprocessor system which interprets the input codes it receives as characters or control signals, and stores them in its buffer memory. As soon as a complete line has been stored or a print command received, the print cycle is initiated. This begins with turning on the motor, together with the feed and print solenoids. A cam is then engaged in the helical drive shaft, moving the printhead across the paper.

While the printhead is making this traverse, the microprocessor sends out electrical pulses to it such that the pattern of dots formed on the paper makes up the characters to be printed on that line.

The microprocessor shares its time between reading in new data and organizing the printing of each line so that the buffer can be filling up with new data at the same time as spaces are being emptied by the printing of the previous line.

The interface normally accepts parallel transmission of ASCII signals with Acknowledge and Busy signals being sent back to the data source. Serial models also have RS-232-C and 20mA Current Loop inputs as standard for serial data transmission at rates up to 1200 baud. Additional baud rates from 50 to 9600.

7.2 INTERFACE AND SIGNAL CONNECTIONS

The basic printing characteristics are determined by the positions of jumpers J1 through J8 on the printer control card. The jumper positions are shown on the component layout diagram, Figure 10-2. Access to the circuit is described in Section 8, Maintenance.

JUMPER	SHORT	OPEN	REMARKS
J1, J2	J1, J2	-	Sets 80 column at start-up.
	J2	J1	Sets 40 column at start-up. (As shipped from the factory.)
	J1	J2	Sets 27 column at start-up.
	-	J1, J2	Sets 20 column at start-up.
J3	Variable	Fixed	Fixed format does not respond to any ASCII control characters except LF, Bell.
J4	Parallel	Serial	J4 always shorted.

JUMPER	SHORT	OPEN	REMARKS
J5	8-bits	7-bits	Irrelevant when J4 is shorted.
J6	U/L case	U/only	Sets 96- or 64-character ASCII set.
J7	512 buffer	256 buffer	Sets input buffer size. Must be set for 256.
J8	External memory	Standard	Must be set for standard memory.

7.3 SOFTWARE CONTROL OF MIXED CHARACTER SIZE

When a variable character size format is selected, extra ASCII codes are recognized by the interface.

FUNCTION	ASCII	BINARY	OCTAL	HEX	MANY KEYBOARDS
Change to 80 col	GS	001 1101	035	1D	Control]
Change to 40 col	RS	001 1110	036	1E	Control ^
Change to 20 col	US	001 1111	037	1F	Control -

Power-on will select 80-column format, and receipt of either "change to 40 col" or "change to 20 col" code will select that format until overridden by a subsequent "change to..." code. In formatting a layout the line may be thought of as having 80 spaces, where a 20-column character fills 4 spaces, a 40-column character fills 2 and an 80-column character fills one space. Autoprint will cause the line to print when 80 or more of these spaces are filled.

7.4 LINEFEED (NEW LINE)

This terminates a line and causes it to be printed out. When J3 is open, this is the only ASCII control character recognized by the controller.

FUNCTION	ASCII	BINARY	OCTAL	HEX	MANY KEYBOARDS
Linefeed of print	LF	000 1010	012	0A	Control J
Sound buzzer	BEL	000 0111	007	07	Control G

7.5 REVERSE PRINTING

The SI/SO commands cause the printout to be reversed whereby characters are printed light against a dark background.

FUNCTION	ASCII	BINARY	OCTAL	HEX	MANY KEYBOARDS
Start reverse printout	SI	000 1111	017	0F	Control O
Stop reverse	SO	000 1110	016	0E	Control N

Note: The reverse printout feature may be used to plot histograms by printing a number of ASCII "spaces" bracketed by SI/SO commands. This will cause a solid dark bar to be printed of length proportional to the number of spaces and the character size selected.

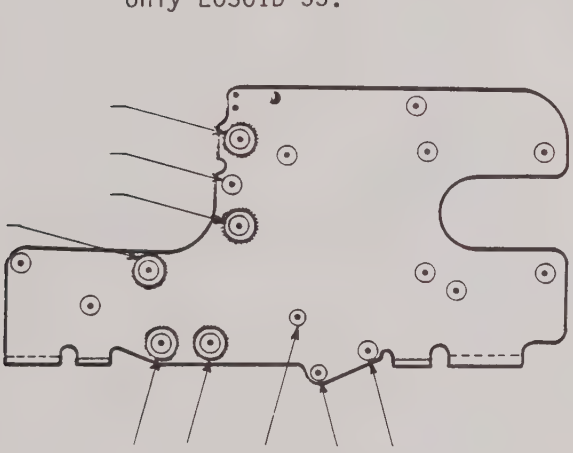
8. SERVICE

8.1 ROUTINE SERVICE

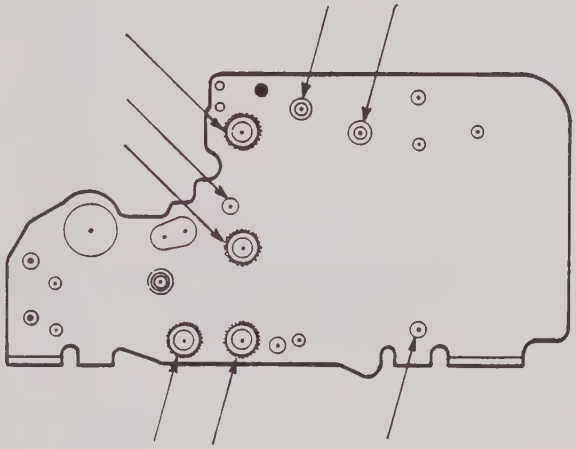
WARNING

Hazardous voltages exist in this equipment. Do not attempt access to the interior without first disconnecting the line cord from the power receptacle. Periodically clean and lubricate the printer mechanism approximately every million lines of printing (70 rolls of paper). Clean only with alcohol. Lubricate points as indicated below and on the following page.

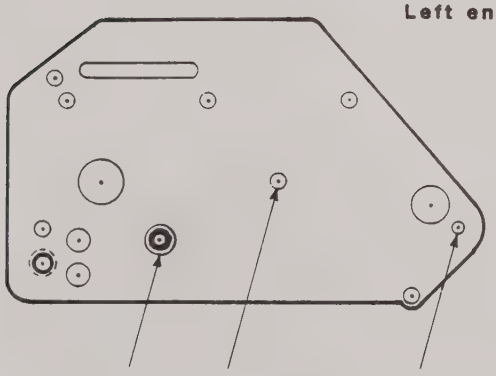
Note: The ball bearings at each end of the helical drive shaft should not be lubricated, nor should the guide rails or the ground return roller surfaces. All other moving parts or cam mating surfaces should be lubricated, using only LOSOID 33.



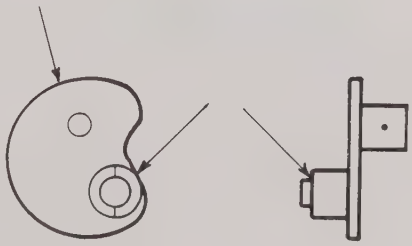
Left end plate unit.



Right end plate unit

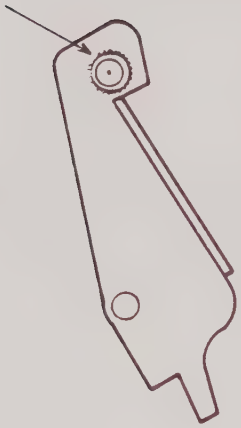


Auxiliary endplate unit.

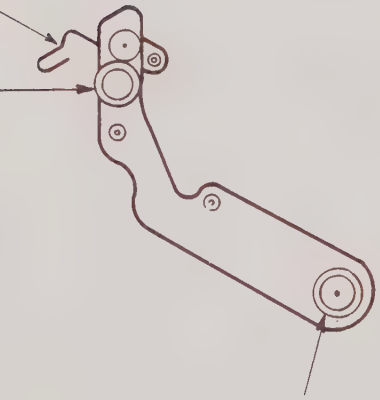


Advance cam unit.

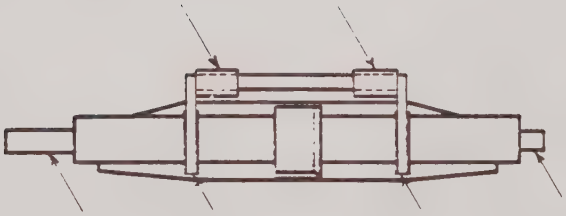
FIGURE 8-1, LUBRICATION POINTS.



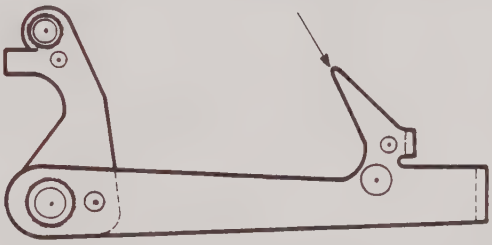
Print coil lever unit.



Cam lever unit.

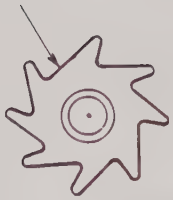


Ground roller unit.



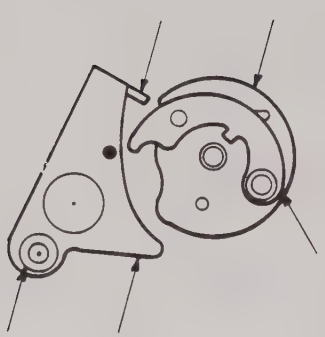
Advance lever (B) un

Ratchet holding pawl unit.



Paper advance ratchet wheel.

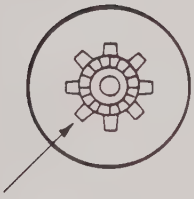
FIGURE 8-1 (CONT.), LUBRICATION POINTS.



Clutch lever unit.

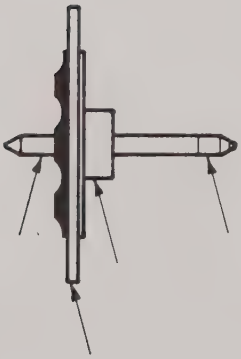
Return spring roller unit.

Advance screw.



Clutch indent gear unit.

Actuator armature unit.

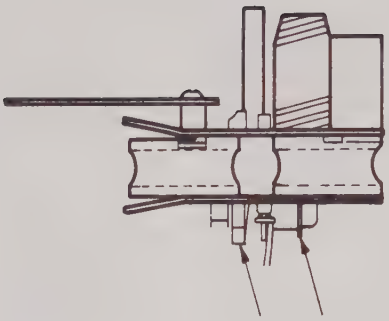


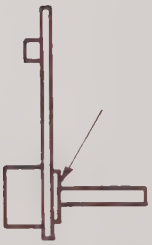
Idler unit.

Clutch indent unit.

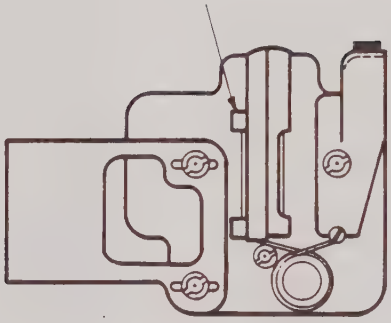
FIGURE 8-1 (CONT.), LUBRICATION POINTS.

Paper advance roller unit.





Actuator lever unit.



Pinhead block.

FIGURE 8-1 (CONT.), LUBRICATION POINTS.

8.2 REPAIR RETURNS

For mechanical damage or electrical malfunctions, refer to Page ii, REPAIR RETURNS.

8.3 ASSISTANCE

For service assistance call the Tau-Tron Customer Service Dept., (617)692-5100 . Their experience and expertise can often save you valuable time in correcting any equipment malfunction.

8.4 PRINTHEAD MAINTENANCE

The printhead should last for between one and two million lines of printing (70-140 rolls of paper). Missing rows of dots, smudged or excessively faint characters indicate that the printhead needs readjustment or replacement.

8.4.1 PRINTHEAD ACCESS

The printhead is exposed when the upper half of the case is removed as described in Paragraph 8.4.4.

CAUTION: The AC power should be disconnected before making any mechanical adjustments.

Bent wires can sometimes be repaired using fine tweezers or a flat blade, but they are very brittle and it is usually better to replace the printhead.

8.4.2 DAMAGED PLATEN (PRINT BLOCK)

First, remove the paper and wipe off any foreign material. If the platen is scored, it can be smoothed with fine sandpaper such as supplied with a new printhead.

8.4.3 PRINTHEAD REPLACEMENT

The printhead assembly consists of fine printing wires mounted in a small plastic head, a flat flexible cable, and an edge connector which makes contact with the circuit board under the mechanism.

1. Remove the knurled plastic printhead retaining screw to free the printhead, and pull the edge connector forward, off the circuit board.
2. Mount the new printhead by reversing Step 1. Before tightening the plastic retaining screw, adjust the head so that the wires make uniform contact with the platen.

3. Load fresh paper if necessary, and test the adjustment of the head by turning on the power and printing a line (most conveniently by using the SELF TEST button on the front panel).

4. If the printing is uneven (top or bottom dots barely visible), loosen the printhead retaining screw slightly and gently press the front or back of the printhead as required to rotate the print wires into parallel alignment with the print block. Occasionally, a new printhead will require "bedding down" before even printout is obtained. This may be rapidly achieved by inserting a small strip of fine sandpaper (supplied with each printhead) into the paper guide at the surface of the print block. Gently pass the printhead once or twice across the sandpaper by hand to remove any irregularities and fully "bed down" the new print wires.

NOTE: The printer should be turned off while making the above adjustment. Once printing becomes uniform, the head should stay in adjustment for its lifetime.

The case may now be closed and the printer put back into operation.

8.4.4 CASE REMOVAL

First, remove the paper from the printer mechanism. The paper roll may be left in place in its cavity in the upper half of the case. Now, remove the three screws holding the upper cover to the base. There are two screws at the back of the base. The cover should now lift off as a unit exposing the mechanism and its electronics.

NOTE: The power should be disconnected before removing the cover since the electrical connections will be exposed. Subsequent electrical tests should only be performed by a qualified technician.

The printer is equipped with a safety interlock which will not allow printing to take place when the cover is removed. For service by a qualified technicain, this interlock may be defeated by grounding the forward cover retaining screw.

8.4.5 50/60Hz OPERATION

Whenever reassembling the printer, check the position of the rubber drive belt connecting the motor to the helical drive shaft. There are two sets of pulleys, the inner ones (nearer to the motor) are for 60Hz operation, the outer for 50Hz. Wrong placement will produce incorrect printing speed and character size.

8.4.6 STORAGE

If the printer is to be stored for an extended period of time, ensure that there is paper in place through the paper advance mechanism. A dessicant should be packed with the printer in a closed polyethylene bag.

8.4.7 SELF TEST

The SELF TEST button located on the front panel is an alternate action pushbutton switch which, when latched, causes a test pattern to be printed out in the absence of any incoming data. This provides a useful check on the correct operation of most of the printer functions, but does not guarantee that the printer is working correctly in all situations.

The self-test feature will only operate when the printer is in an off-line condition and the paper lid is closed.

8.5 TROUBLE ANALYSIS

This section provides guidelines for locating and correcting the majority of simple faults which may develop on Tau-Tron 5901 Printers. It is not intended, nor is it recommended, that any repairs be attempted to the Intel 8048 controller PC board. All faults of this type should be referred to Tau-Tron's Customer Service Dept.

8.5.1 POOR QUALITY PRINTOUT

Most printout quality problems can be traced to badly loaded or torn paper or lack of printhead maintenance. Always load paper carefully, check that it is free of wrinkles or tears and that it moves freely (use paper advance button). If printout quality starts to deteriorate, locate and correct the fault as soon as possible.

FAULT	PROBABLE CAUSES/REMEDIES
Uneven, irregular or smudged printout. No consistency.	1. Printhead clogged. Remove and clean. 2. Worn printhead. Replace as described in Paragraph 8-4.
Missing row of dots.	1. Burned out drive circuit. Replace U1 if missing row is in the top half of character. U2 if in bottom half (see Fig. 10-2). 2. Broken wire in printhead (visible on close inspection). Replace printhead as described in Paragraph 8-4. 3. Printhead misaligned. Most likely when top or bottom row is missing. Loosen knurled printhead retaining screw and realign (see Paragraph 8-4).
Excessive background "Striping".	1. Printhead misaligned. Realign as described in Paragraph 8-4. 2. New printhead needs bedding down (see Paragraph 8-4). 3. When accompanied by mis-shapen characters, indicates damaged print wires. Replace printhead as described in Paragraph 8-4. 4. Damaged platen. Replace.

FAULT	PROBABLE CAUSES/REMEDIES
Adjacent rows of dots always print identically.	1. Short circuit in printhead or driver circuitry. Remove controller PCB and check resistance between terminals on connector J1 (see Paragraph 8-4). If shorted, then fault is in printhead. Remove printhead, clean both ends and, if necessary, replace. If open, then fault is in controller PCB. Check U1 and U2 at input and output stages.
Uneven character widths.	1. Clean and, if necessary, replace rubber drive belt. 2. Clean guide rails with alcohol. These must be dry and completely free of grease. 3. Clean rubber damper with a moist cloth. 4. If none of the above measures has any effect, then replace print carriage and guide rail assemblies as a unit.
Uneven vertical spacing between lines.	1. Excess tension in paper path. Check that paper roll is correctly mounted and that it rotates freely. 2. Worn ratchet wheel. Replace.

8.5.2 NO PRINTOUT

FAULT	PROBABLE CAUSES/REMEDIES
Printer accepts data until buffer is full. Motor turns on. Buzzer sounds. Self-test inoperative.	1. Out of paper. Reload. 2. Paper lid not closed. Printer "thinks" it is out of paper.
Printer accepts data until buffer is full. Motor turns on and single linefeed is performed. No buzzer. Self-test inoperative.	1. Print solenoid jammed or inoperative. Check that mechanism is clear. Also check driver circuit.

FAULT	PROBABLE CAUSES/REMEDIES
Printer accepts data until buffer is full. Motor turns on and single "click" is heard. No Linefeed. No buzzer. Self-test inoperative.	1. Paper advance solenoid jammed or inoperative. Check that mechanism is clear. Also check driver circuit.
No data accepted. No buzzer. Self-test works.	1. Printer off line. 2. Jumpers set for wrong type of input; i.e., (serial instead of parallel or vice-versa) see Paragraph 7-2. 3. Data source not transmitting. 4. Baud rate setting completely wrong. 5. Faulty controller. Return complete printer for service.
No printout. No data accepted. No buzzer. Self-test inoperative.	1. Fuse blown or printer not turned on. 2. Self-test does not operate when printer is on line. Take printer off line and recheck. 3. Return complete printer for service.

8.5.3 GARBLED PRINTOUT

Most faults involving "garbled" printout can be traced to incorrect baud rate settings or wrongly wired input connections. It is very helpful to compare the difference between transmitted and printed data with the ASCII character table. This often pinpoints any "jammed" data bits.

FAULT	PROBABLE CAUSES/REMEDIES
Printer operates normally in all respects except that printout is garbled. Self-test works correctly.	1. Marginally wrong baud rate setting. 2. Input timing marginal. Check against minimum requirements in Section 7. 3. Data source at fault (wrong baud rate, output connections, etc.). 4. Input connector wrongly wired (see Section 7).

FAULT	PROBABLE CAUSES/REMEDIES
	5. Return complete printer for service. Before doing this, double check all of the above possibilities. Most printers that are returned for this fault do not, in fact, have anything wrong with them.
Printer operates normally in all respects except that occasional characters are missed or printed incorrectly.	1. Incorrect use of DTR signal to throttle serial data source. Check timing requirments of transmitter inhibit signal.

9. REPLACEABLE PARTS

This section contains a complete lising of all electronic components and mechanical parts subject to normal wearout or failure. Reference designations include components with Axiom part numbers only.

Ref Des	Description	Axiom No.
	COMPONENT LAYOUT	
R1 thru R8	Resistor, 68 ohms 5%, 1/4W	1000-680
R9	Resistor, 300 ohms 5%, 1/4W	1000-301
R11	Resistor, 300 ohms 5%, 1/4W	1000-301
R12	Resistor, 33K 5%, 1/4W	1000-333
R13	Resistor, 4.7K 5%, 1/4W	1000-472
R14	Resistor, 4.7K 5%, 1/4W	1000-472
R15	Resistor, 2K 5%, 1/4W	Not Known
R16 thru R19	Resistor, 12K 5%, 1/4W	1000-123
R21	Resistor, 220 ohms 5%, 1/2W	1001-221
R22	Resistor, 4.7K 5%, 1/4W	1000-472
R23	Resistor, 4.7K 5%, 1/4W	1000-472
R24	Resistor, 4.7K 5%, 1/4W	1000-472
R27	Resistor, 4.7K S.I.L.	1000-472
R28	Resistor, 150K 5%, 1/4W	1000-154
R29	Resistor, 150K 5%, 1/4W	1000-154
C1	Capacitor, 10uf 16V Tantalum	1029
C2	Capacitor, 1.0uf 16V Tantalum	1031
C3	Capacitor, 4700uf 16V Electrolytic	1049
C4	Capacitor, 1000uf 35V Electrolytic	1032
C5	Capacitor, 100uf 100V Electrolytic	1041
C6 thru C13	Capacitor, .01uf Poly.	1024

Ref Des	Description	Axiom No.
C16	Capacitor, .001uf Ceramic Disk	1023
C17	Capacitor, .001uf Ceramic Disk	1023
C18	Capacitor, .002uf Poly.	1053
C19	Capacitor, .001uf Ceramic Disk	1023
C20	Capacitor, .001uf Ceramic Disk	1023
C21 thru C24	Capacitor, .1uf 50 Mon Ceramic	1050
C25	Capacitor, .70pf Ceramic Disk	1046
C26	Capacitor, .70pf Ceramic Disk	1046
C30	Capacitor, 1uf 35V Tantalum	1031
C31	Capacitor, .220pf Mon Ceramic	1021
D1 thru D7	Diode, IN 4003	1301
D8 thru D15	Diode, IN 4148	1300
D16	LED, 5059-1	1305
D17	Opto Isolator, FCD 820	1308
D18	Diode, IN 4148	1300
D19	Diode, IN 4148	1300
D20	Diode, Zener IN 967	1309
U1	Integrated circuit, UDN 2841	1121
U2	Integrated circuit, UDN 2841	1121
U3 thru U6	Integrated circuit, 74LS374	1126
U7 thru U10	Integrated circuit, 9111-A	1124

Ref Des	Description	Axiom No.
U11	Integrated circuit, 8048	1123
U12	Integrated circuit, 74LS04	1124
U13	Integrated circuit, 74LS74	1130
U14	Integrated circuit, 74LS32	1131
U15	Voltage Regulator, 7805	1206
U18	Integrated circuit, LM311	1133
Q1	Transistor, MPSU45	1202
Q2	Transistor, MPSA13	1200
Q3	Transistor, MPSA13	1200
Q4	Transistor, 2N3904	1203
Y1	Crystal, 6.000MHz	1351
S1	Switch, non-locking	1490
S2	Switch, 10-position	1379
S3	Switch, Locking	1488
S4	Switch, Locking	1488
K1	25-Pin Connector, DB25S	1482
K2	10-Pin Connector, 1x16 DIL	1450
K3	26-Pin Connector, 1x26 DIL	1450
K7	20-Pin Socket,	1444
K8	40-Pin Socket, DIP	1485
K9	6x1 Pin, Row	1452
___	Heat sink	1588
___	Transformer	5150
___	Board	5117
___	Plate	5010
___	Button Cap (3)	1484
___	Washer (2)	1512
___	Threaded Spacer	1552
___	Screw (4), 40x3/8 RH	1555
___	Lockwasher #4 (4)	1557
___	Hex nut #4 (4)	1559

Ref Des	Description	Axiom No.
	MOTOR CONTROL ASSEMBLY	
R10	Resistor, 300 ohms 5%, 1/4W	1000-301
C14	Capacitor, .1uf	1025
C27	Capacitor, 2.2uf	1043
C35	Capacitor, .01uf	1024
___	Triac 1	1213
D23	Diode, IN 4148	1304
___	Relay, Reed	1360
	HS COMPONENT LAYOUT	
C101	Capacitor, 10uf	Not Known
C102	Capacitor, 10uf	Not Known
C103	Capacitor, 10uf	Not Known
C104	Capacitor, 1000uf	Not Known
C105	Capacitor, 1000uf	Not Known
D101 thru D104	Diode, IN 4003 (4)	Not Known
U101	Integrated circuit, 5046	Not Known
U102	Integrated circuit, 2017	Not Known
U103	Integrated circuit, 74LS04	1129
U104	Integrated circuit, MC1488	Not Known
U105	Integrated circuit, 74LS32	1131
U106	Integrated circuit,	Not Known
U107	Integrated circuit,	Not Known
XTAL 101	Crystal	Not Known
S 101	8-position switch	Not Known
K 103	26-pin Connector	Not Known
K 109	6-pin Connector	Not Known

10. DIAGRAMS

This section includes the following diagrams:

FIGURE	DESCRIPTION
10-1	Ascii Codes
10-2	Component Layout Diagram
10-3	Printer Schematic Diagram
10-4	HS Component Layout Diagram
10-5	HS Schematic Diagram
10-6	Motor Delay Circuit Diagram

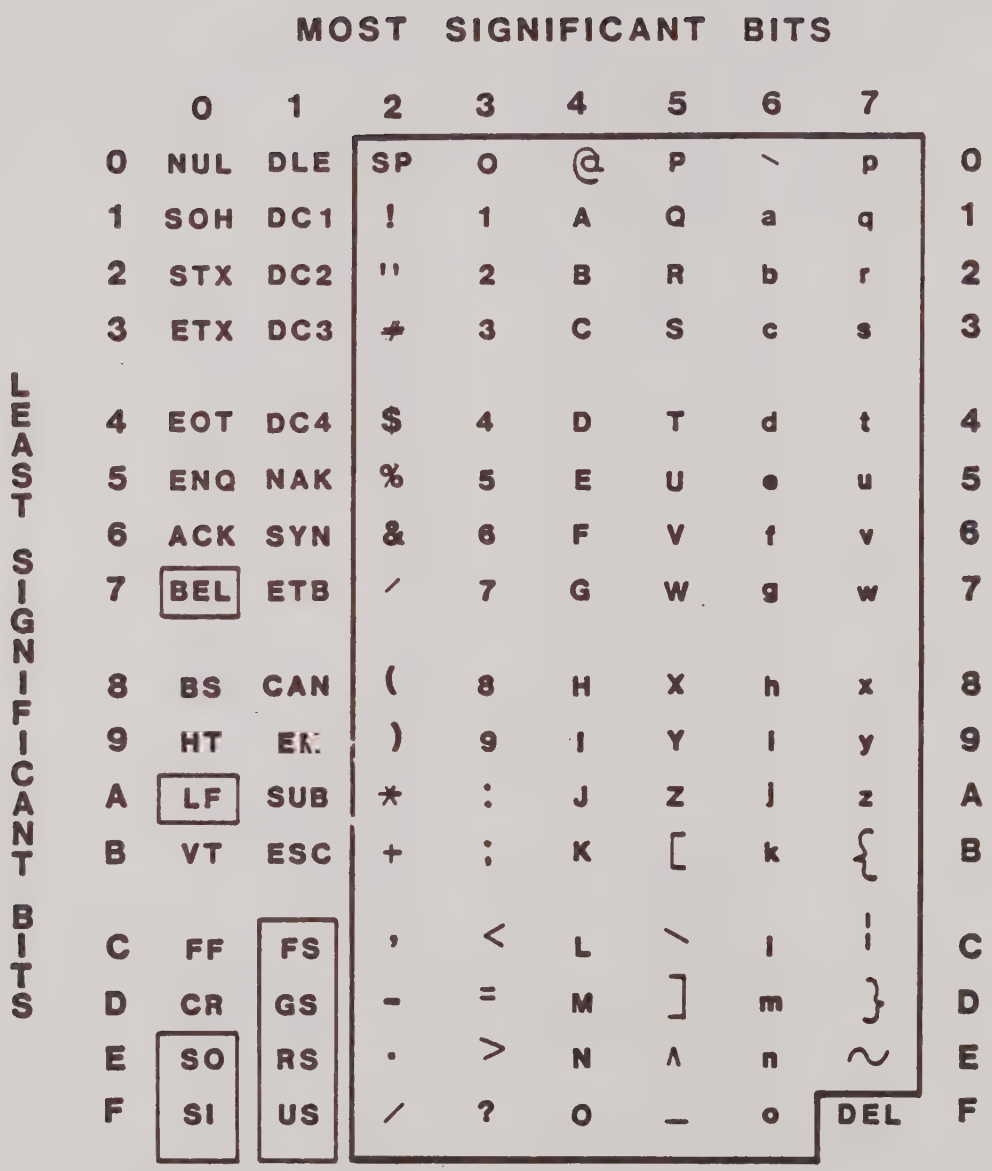

MOST SIGNIFICANT BITS
LEAST SIGNIFICANT BITS
0 1 2 3 4 5 6 7
0 NUL DLE SP 0 @ P ` p 0
1 SOH DC1 ! 1 A Q a q 1
2 STX DC2 " 2 B R b r 2
3 ETX DC3 # 3 C S c s 3
4 EOT DC4 $ 4 D T d t 4
5 ENQ NAK % 5 E U e u 5
6 ACK SYN & 6 F V f v 6
7 BEL ETB ' 7 G W g w 7
8 BS CAN (8 H X h x 8
9 HT EM) 9 I Y i y 9
A LF SUB * : J Z j z A
B VT ESC + ; K [k { B
C FF FS , < L \ l | C
D CR GS - = M] m } D
E SO RS . > N ^ n ~ E
F SI US / ? O _ o DEL F

FIGURE 10-1
1 of 1

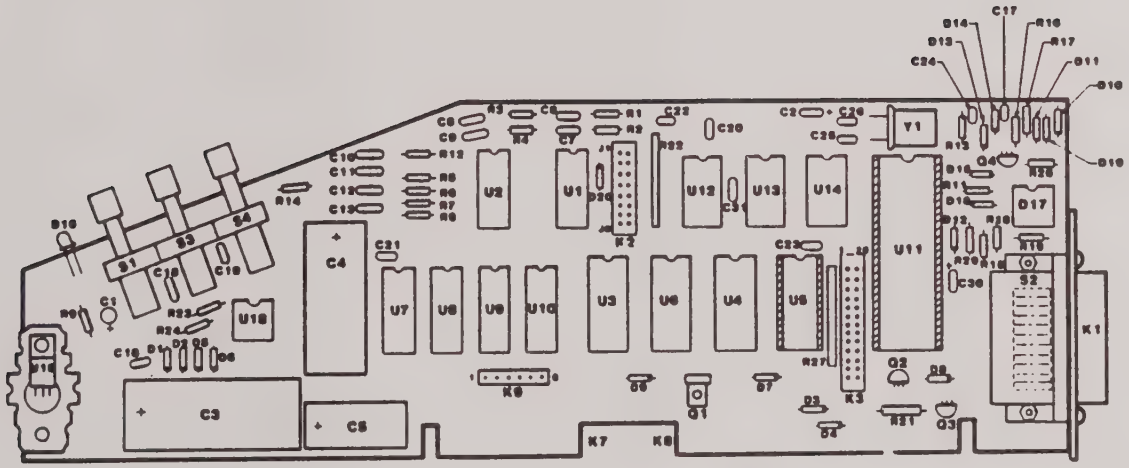
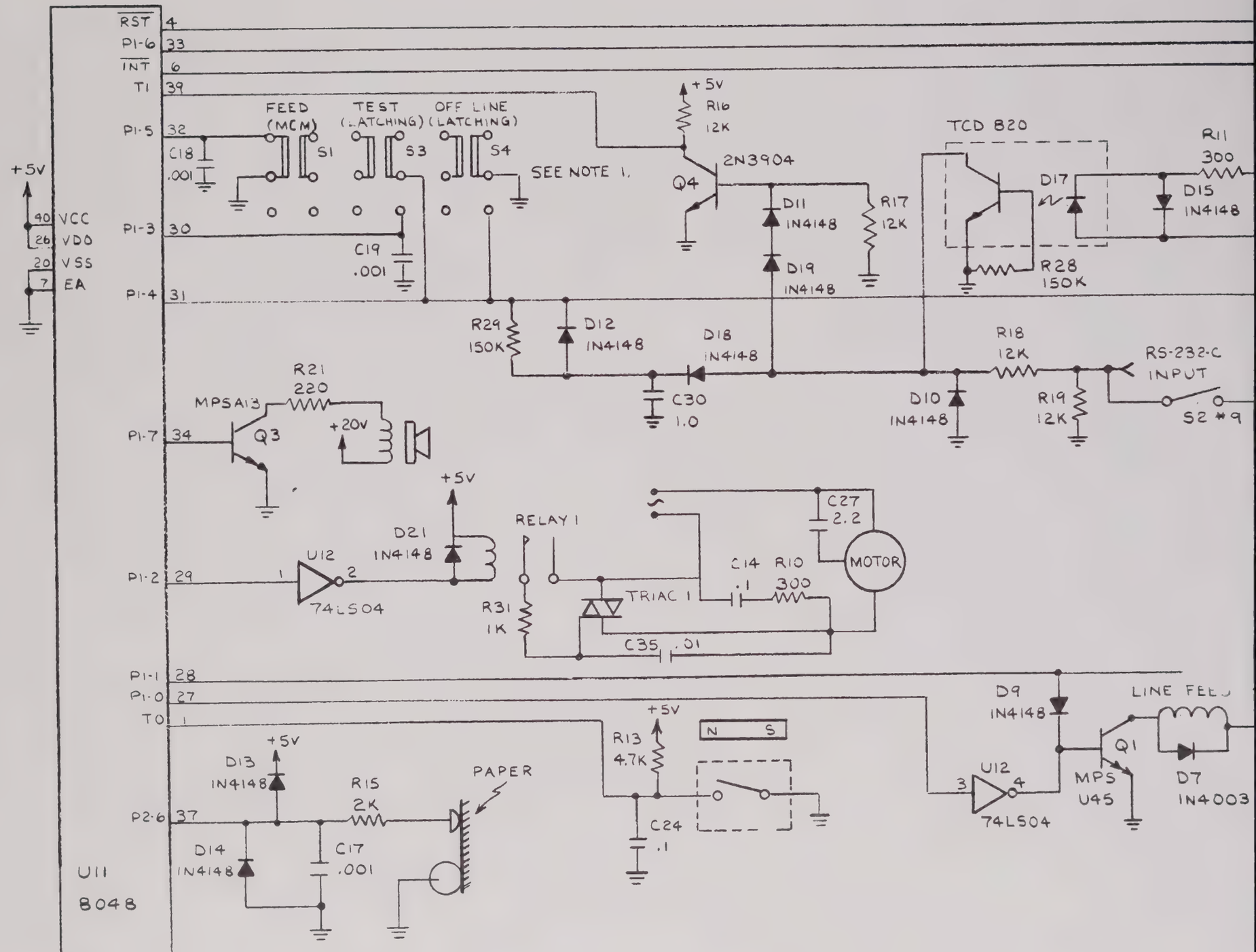


FIGURE 10-2
1 of 1



NOTES:

1. SWITCHES S1, S3 AND S4 ARE SHOWN IN INACTIVE POSITION.

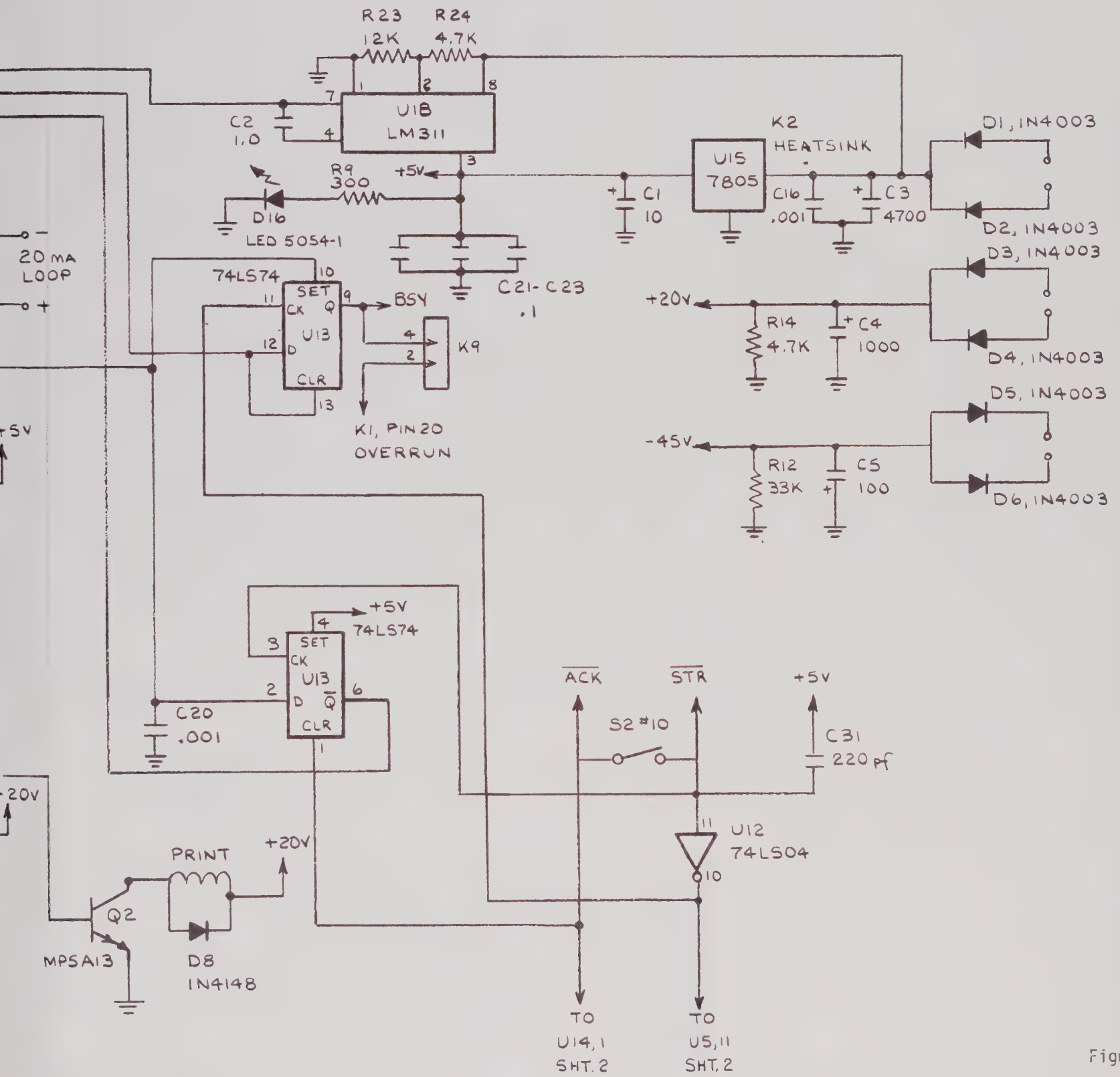


Figure 10-3
5901 PRINTER
CIRCUIT SCHEMATIC
SHT. 1 of 2

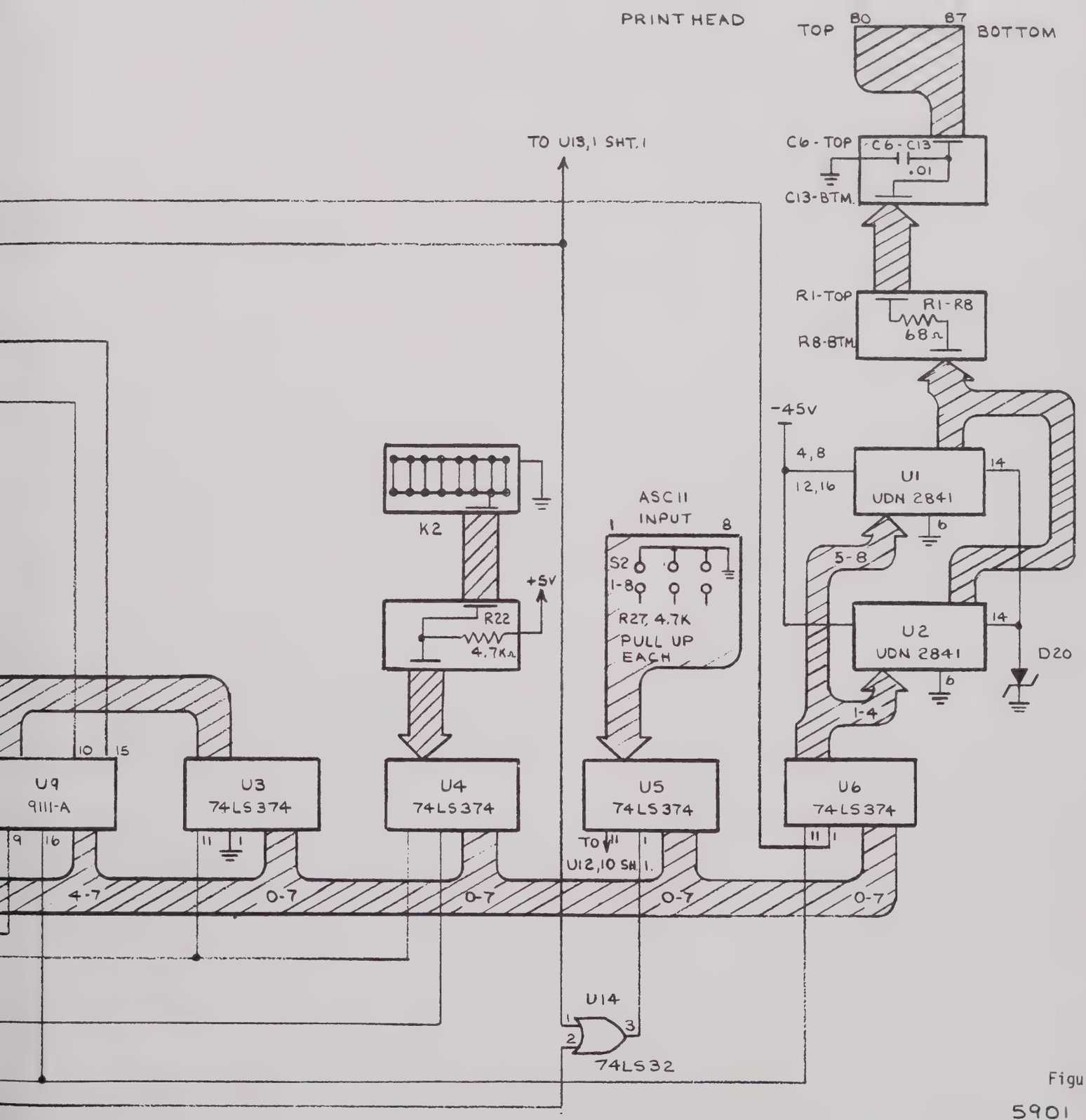
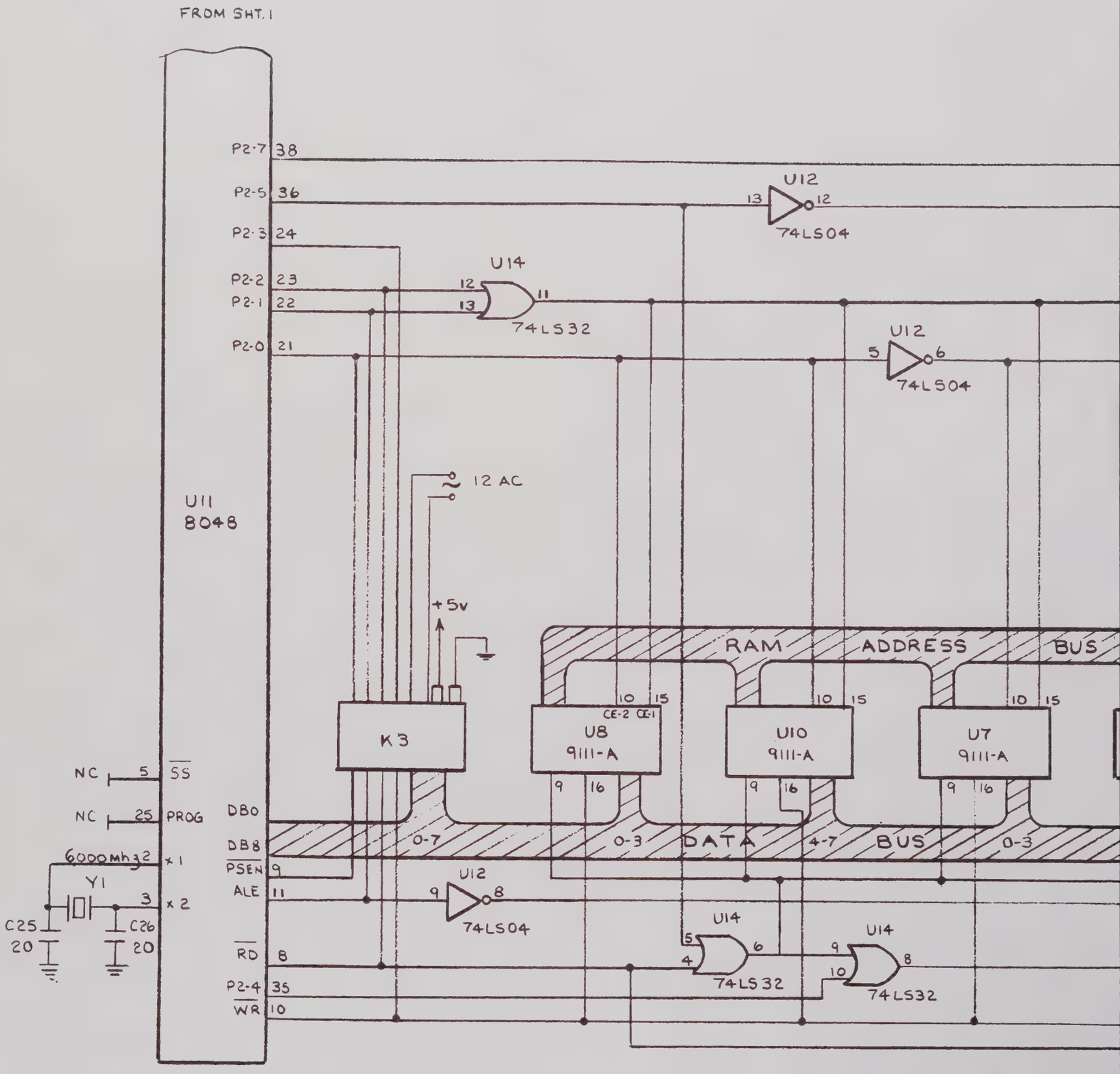


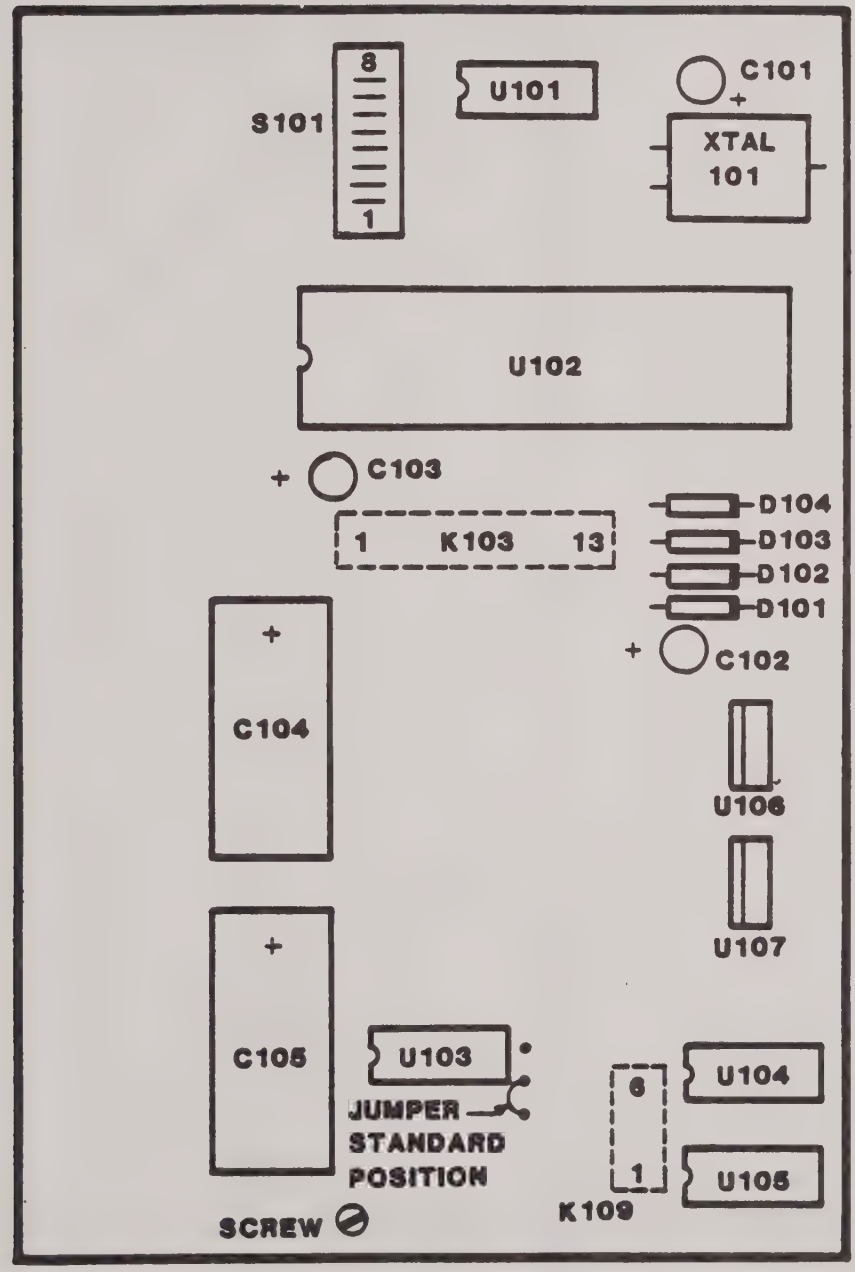
Figure 10-3

5901 PRINTER

CIRCUIT SCHEMATIC

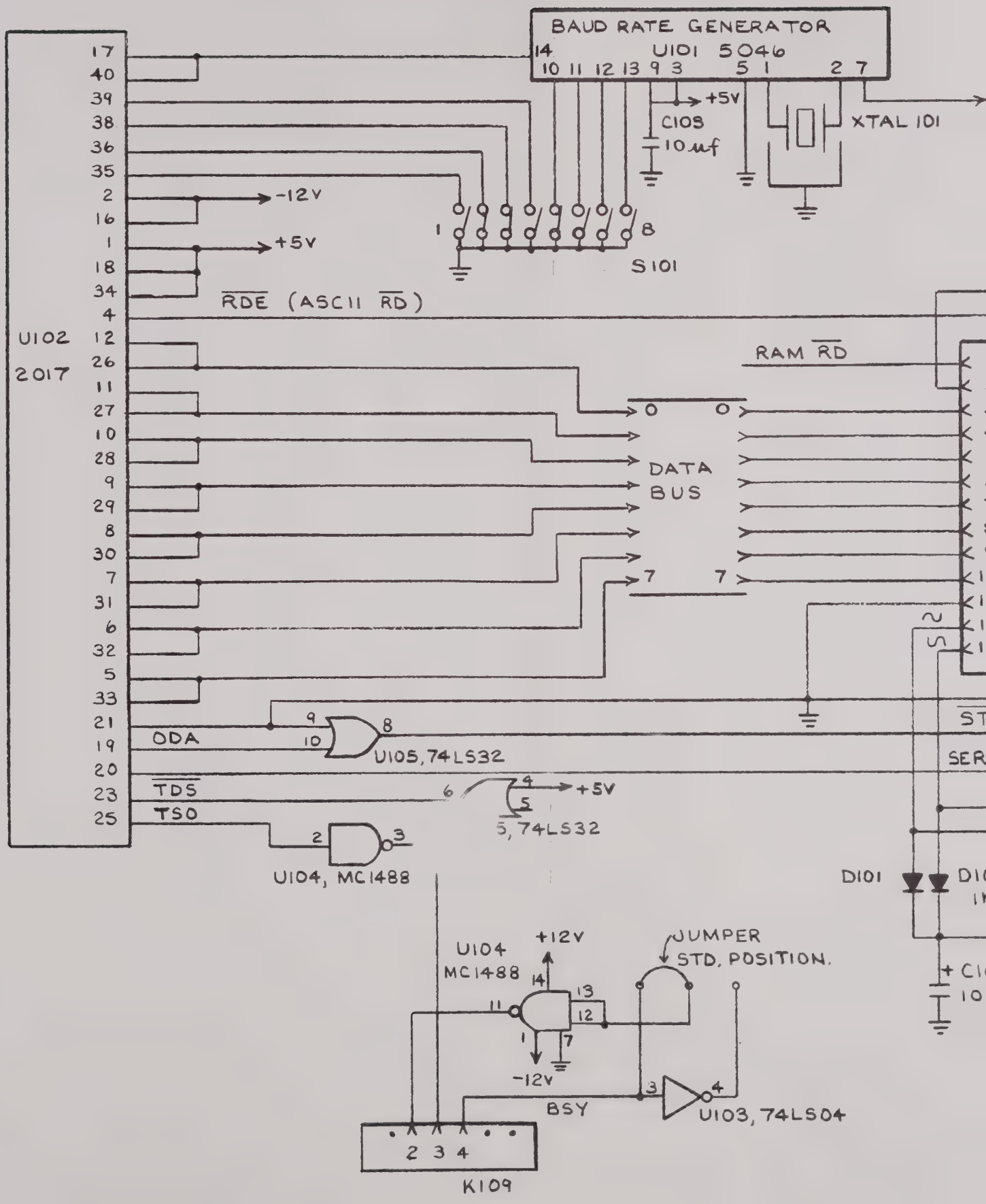
SHT 2 of 2.


FROM SHT. 1
U11
8048
P2-7 38
P2-5 36
P2-3 24
P2-2 23
P2-1 22
P2-0 21
U12
74LS04
U14
74LS32
12 AC
+5v
K3
RAM ADDRESS BUS
U8
9111-A
U10
9111-A
U7
9111-A
CE-2 CE-1
0-7
0-3
DATA BUS
4-7
0-3
NC 5 SS
NC 25 PROG
6.000mhz2 x1
Y1
3 x2
C25 20
C26 20
DB0
DB8
PSEN 9
ALE 11
RD 8
P2-4 35
WR 10



HS COMPONENT LAYOUT

FIGURE 10-4
1 of 1


BAUD RATE GENERATOR
U101 5046
14
10 11 12 13 9 3 5 1 2 7
+5V
C103
10 uf
XTAL 101
S101
1
8
-12V
+5V
RDE (ASCII RD)
U102
2017
17
40
39
38
36
35
2
16
1
18
34
4
12
26
11
27
10
28
9
29
8
30
7
31
6
32
5
33
21
19
20
23
25
RAM RD
DATA
BUS
0
0
7
7
ODA
9
10
8
U105, 74LS32
TDS
TSO
6
4
5
+5V
5, 74LS32
2
3
U104, MC1488
D101
U104
MC1488
+12V
JUMPER
STD. POSITION.
14
13
11
12
1
7
-12V
BSY
3
4
U103, 74LS04
2 3 4
K109

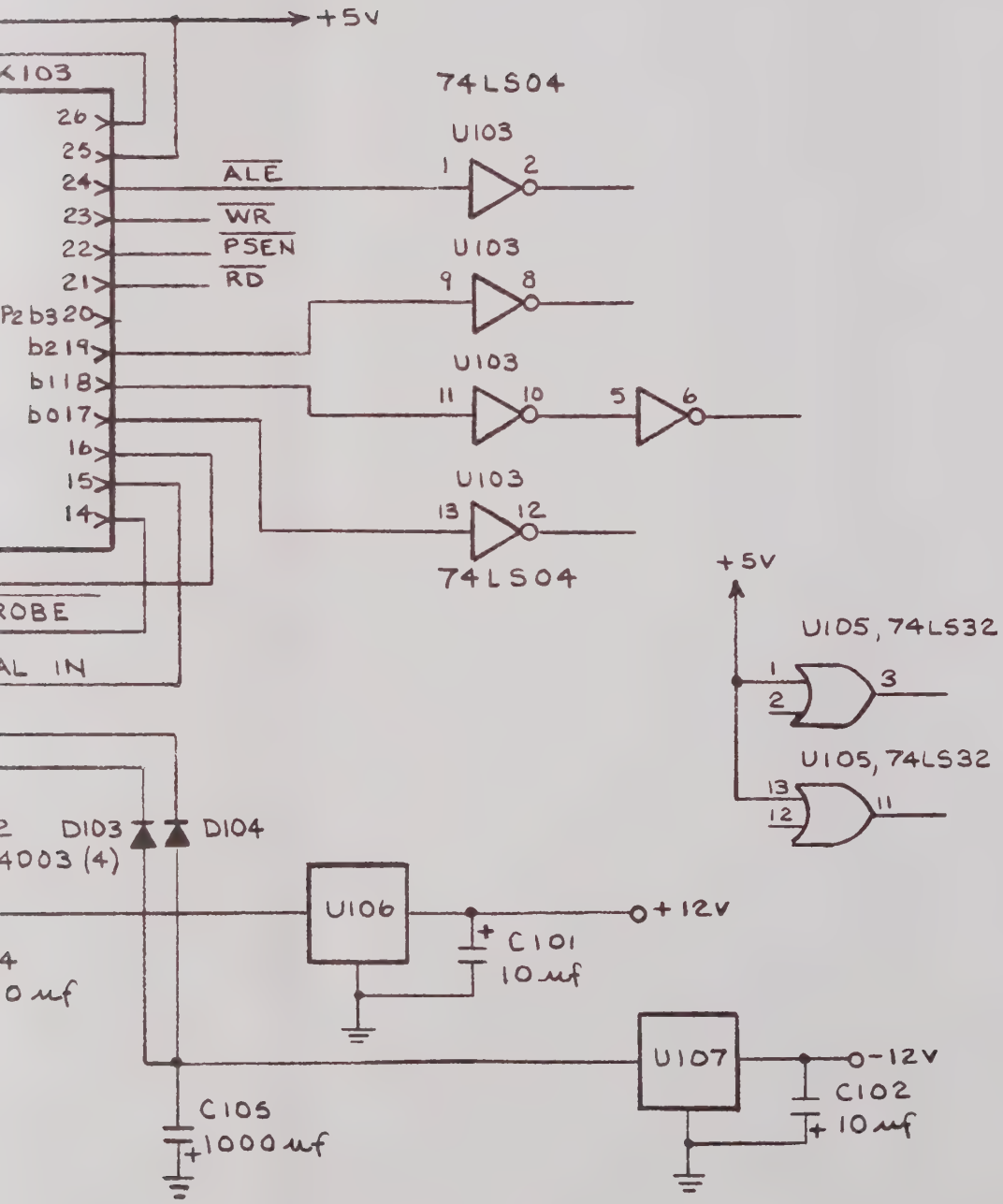
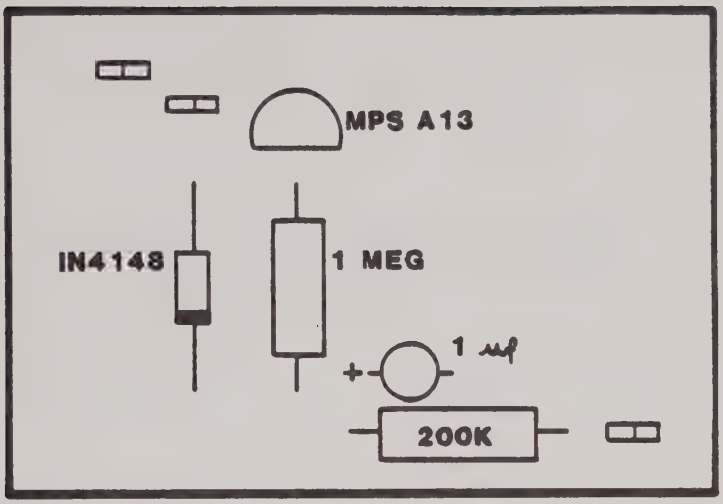


Figure 10-5

HS SCHEMATIC.



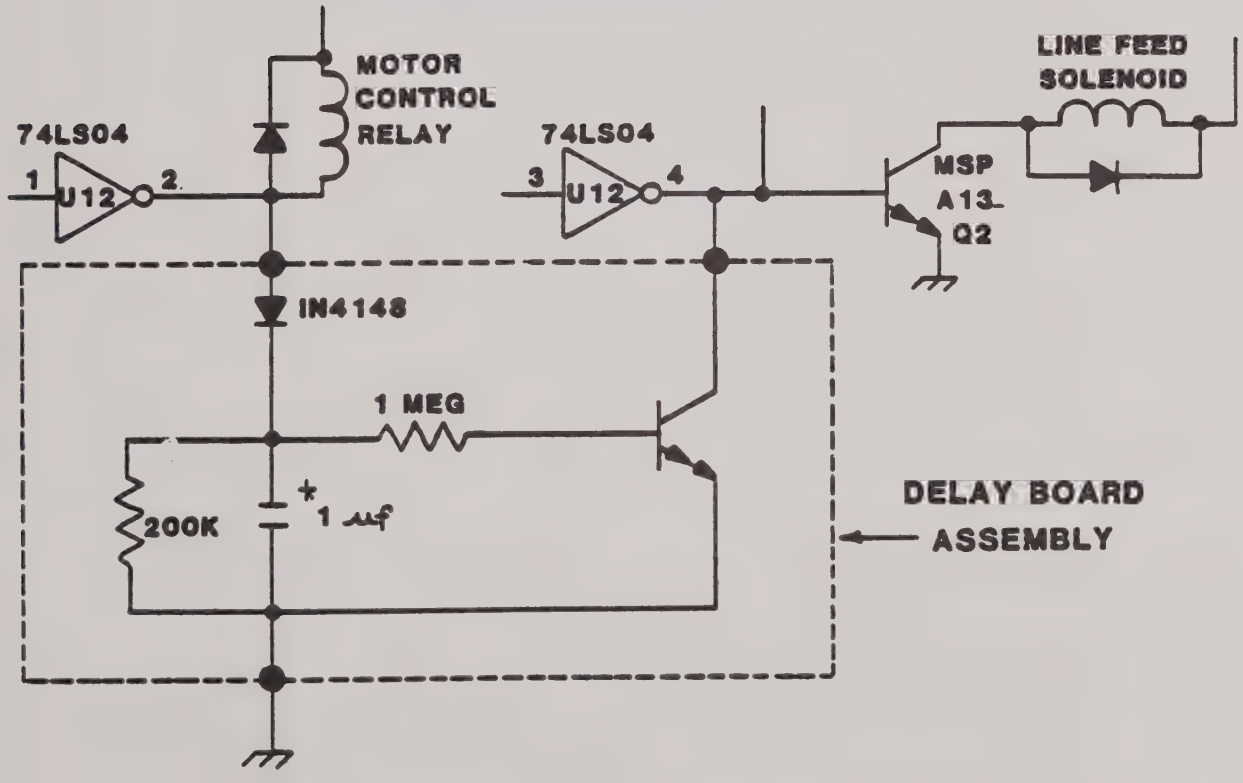


FIGURE 10-6
1 of 1

FOR FUTURE UPDATES

If you want to receive updates or revised issues of this manual, please complete and mail the postage paid card below. *If you fail to do so, important updated information pertaining to this document will not be forwarded to you.*

If you would like a representative to call, require additional information on Tau-tron products, or would like to be placed on our mailing list, please complete and mail the *lower* postage paid card.

Instruction Manual Form Number ☐☐☐☐–☐☐☐☐☐

☐ Yes, I would like to receive technical updates and revised issues of this document. I have filled in the manual form number above (Form No. is shown on title page).

to: Publications Manager
from:

Name _____ Title _____

Company _____ Dept./MS _____

Address _____ City _____

State & Zip _____ Phone _____

Please —

☐ Have representative call.

☐ Add me to your mailing list.

Send additional information on:

☐ Bit Error Rate Testing
☐ TDM Voice/Data Multiplexers
☐ Digital Transmission Test Sets
☐ Fiber Optic Transmission
☐ Data Loggers
☐ High Speed Components

My general application is _____

Name _____ Title _____

Company _____ Dept./MS _____

Address _____ City _____

State & Zip _____ Phone _____

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 19 WESTFORD, MA

POSTAGE WILL BE PAID BY ADDRESSEE

ATTN: Publications Manager

Tau-tron Inc.
10 Lyberty Way
Westford, MA. 01886

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 19 WESTFORD, MA

POSTAGE WILL BE PAID BY ADDRESSEE

ATTN: Sales Department

Tau-tron Inc.
10 Lyberty Way
Westford, MA. 01886

Repair Returns

To return a unit for repair:

1. Call the Customer Service Dept. **(617) 692-5100** or **1-800-TAU-TRON (outside MA)**, for a **Repair Authorization Number.** This will reduce administrative delays and ensure prompt return of your unit.
2. Complete and **attach one of the Repair Tags** below to your unit.
3. **Pack the unit** in the original shipping carton and packaging materials, if available. Otherwise use a double-walled carton (test strength of 350 lb) and shock absorbing material such as bubble wrap to prevent the unit from moving in the carton during transit. Seal with heavy paper tape.
4. **Send to:**

   Tau-tron
   10 Lyberty Way
   Westford, MA 01886
   attn: Customer Service

Repair Tag

Repair Authorization Number _____

Model _____ **Serial Number** _____

☐ Warranty repair ☐ Dead on arrival ☐ Repair ☐ Modification ☐ Recalibration

Symptoms: _____

_____

Name _____ Title _____

Company _____ Dept./MS _____

Address _____ City _____

State&Zip _____ Phone _____

Form 0163-1181A

Repair Tag

Repair Authorization Number _____

Model _____ **Serial Number** _____

☐ Warranty repair ☐ Dead on arrival ☐ Repair ☐ Modification ☐ Recalibration

Symptoms: _____

_____

Name _____ Title _____

Company _____ Dept./MS _____

Address _____ City _____

State&Zip _____ Phone _____

Form 0163-1181A

10 Lyberty Way, Westford, MA 01886
(617) 692-5100 Telex 750245 1-800-TAU-TRON (Outside MA)